LAWLER, METZGER, KEENEY & LOGAN, LLC

1717 K STREET, NW
SUITE 1075
WASHINGTON, D.C. 20006

REGINA M. KEENEY

PHONE (202) 777-7700
FACSIMILE (202) 777-7763

June 12, 2017

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: *Ex Parte* Notice: *TerreStar Corporation Request for Temporary Waiver of Substantial Service Requirements*– WT Docket No. 16-290

Dear Ms. Dortch:

On June 8, 2017, Douglas Brandon, Secretary of TerreStar Corporation ("TerreStar"), John Dooley of Jarvinian Advisors LLC, Steve Berman of Lawler, Metzger, Keeney & Logan, LLC, and I met with Rachael Bender, Wireless and International Advisor to Chairman Ajit Pai, and Jay Kaplan from the Office of Chairman Pai, regarding TerreStar's above-captioned request for temporary waiver of its substantial service requirements in the commercial 1.4 GHz band.[1] During this meeting, TerreStar's representatives described TerreStar's multi-year effort to identify the best and safest use of its 1.4 GHz licenses, its pending Waiver Request, and its planned wireless medical telemetry use of its spectrum.[2]

As explained at our meeting and in TerreStar's filings in this proceeding, grant of TerreStar's request meets the Federal Communications Commission's ("Commission's") criteria for temporary waiver, given the unique adjacency of TerreStar's spectrum with the dedicated 1.4 GHz Wireless Medical Telemetry Service ("WMTS") bands, the unique sensitivity of the WMTS

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[1] TerreStar Corporation Request for Temporary Waiver of Substantial Service Requirements, WT Docket No. 16-290 (Aug. 12, 2016) ("Waiver Request"); *Wireless Telecommunications Bureau Seeks Comment Regarding TerreStar Corporation's Request for Relief of Certain 1.4 GHz Construction Requirements*, Public Notice, 31 FCC Rcd 9798 (2016). *See also* Supplemental Comments of TerreStar Corporation, WT Docket No. 16-290 (June 7, 2017) ("Supplemental Comments").

[2] During our meeting, we showed Commission staff an electronic version of the attached slide presentation.

life-saving equipment already deployed, and the important benefits that a waiver will generate for millions of patients in hospitals and other health care facilities across the nation. A grant will facilitate TerreStar's rapid deployment of this beneficial medical telemetry service, enabling more efficient use of its spectrum without causing interference to WMTS and other spectrum neighbors.[3]

As TerreStar has described in this proceeding, the development of wireless medical telemetry over the past three decades has yielded enormous health care benefits. The reliability of these life-critical transmissions could be jeopardized in the coming years, however, by a shortage of spectrum for this service. Demand for remote patient monitoring in American hospitals and other health care facilities will likely continue to increase significantly over the next decade as the U.S. patient population ages and experiences frequent and acute medical problems.[4] Health care providers will respond by deploying additional wireless medical telemetry devices within their facilities, potentially resulting in spectrum congestion and disrupted transmissions. While this threat is already real, no other source of additional, dedicated wireless medical telemetry spectrum has been identified to alleviate this spectrum shortage and address the growing risk of interference to WMTS.[5]

In the face of this growing interference threat, grant of the Waiver Request is a ready pathway to ensuring the reliability and security of wireless medical telemetry operations. As we described in the meeting, because TerreStar's spectrum is adjacent to the WMTS frequencies already dedicated to wireless medical telemetry, this action will enable TerreStar to make available five additional megahertz of spectrum for wireless medical telemetry on a nationwide basis in hospitals and other health care facilities, an approximately 67% increase in capacity at 1.4 GHz. This capacity would be available for existing medical telemetry equipment via a firmware update (and equipment certification), as well as for future equipment. With this

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[3] *See, e.g.*, *AT&T Mobility Spectrum LLC, BellSouth Mobile Data, Inc., New Cingular Wireless PCS, LLC, and SBC Telecom, Inc., Petition for Limited Waiver of Interim Performance Requirement for 2.3 GHz WCS C and D Block Licenses*, Order, WT Docket No. 16-181, DA 17-18, ¶ 1 (WTB rel. Jan. 18, 2017) (granting full waiver from Part 27 interim construction requirement for 2.3 GHz Wireless Communications Service C and D Block licenses nationwide and two-year waiver of final construction requirement for those licenses).

[4] In addition, the types of biometric data transmitted over wireless medical telemetry systems will expand with advances in medical technology, adding significantly more bandwidth demand per patient.

[5] Chairman Pai has pointed out that in health care environments "[h]armful interference could have serious and immediate consequences," since "WMTS can involve matters of life and death." *Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, et al*., Report and Order, 30 FCC Rcd 9551, 9733-34, at Statement of Commissioner Ajit Pai (2015).

expanded capacity, hospitals and health care providers will avoid spectrum exhaustion and congestion while deploying telemetry devices more densely and utilizing new and innovative applications. By advancing the development of wireless medical telemetry, a temporary waiver will significantly enhance the standard of patient care at health care facilities around the United States.

The developmental use of TerreStar's licensed spectrum for medical telemetry applications *outside* health care facilities will also yield substantial public interest benefits. While existing WMTS systems can only be operated within hospitals,[6] this restriction will not apply to TerreStar's operations in the commercial 1.4 GHz band. The operation of medical telemetry devices in mobile settings such as ambulances should produce significant improvements in emergency medical care. Medical telemetry in residences, nursing homes, and rehabilitation centers will provide significant benefits to patients, who increasingly rely on medical treatment in residential and other similar environments and require real-time monitoring. In addition, research and development of wireless medical telemetry equipment promises to stimulate innovation and the development of new medical telemetry applications. Significantly, rural telemedicine applications could benefit patients in rural and remote areas with the greatest need for improved medical care and treatment.

As TerreStar's representatives explained in our meeting, TerreStar's decision to deploy wireless medical telemetry in the commercial 1.4 GHz band is the result of its multi-year effort to identify the best and safest use of its 1.4 GHz licenses.[7] Since gaining control of this spectrum in March 2013 following an extended bankruptcy proceeding, TerreStar's post-bankruptcy owners have worked diligently to develop robust wireless operations in this band, while accounting for the existence of the highly sensitive WMTS systems in adjacent spectrum. The Wireless Telecommunications Bureau ("Bureau") should weigh these efforts in favor of a grant of the Waiver Request.

In early 2013, TerreStar began executing plans for the widespread deployment of a high-power 802.16 WiMAX network for use in smart-grid applications. As part of its WiMAX implementation efforts, TerreStar reached out to incumbents in adjacent spectrum bands in late 2013 to identify any potential technical issues related to its planned smart-grid deployments. In February 2014, WMTS industry representatives expressed concern that high-power, smart-grid WiMAX operations in the commercial 1.4 GHz band would cause significant harmful interference to adjacent-band WMTS operations. After extensive, cooperative technical efforts, TerreStar and these WMTS representatives collectively concluded that a bi-directional WiMAX system at 1.4 GHz, although consistent with Part 27 rules, was fundamentally incompatible with adjacent-band, real-world WMTS receivers, given those receivers' low-power nature and resulting vulnerability to interference. The technical reality was that TerreStar's planned

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6 S*ee* 47 C.F.R. § 95.1107.

7 *See* Supplemental Comments at 14-20.

WiMAX deployment would likely compromise patient safety at the nearly two thousand registered health care facilities that currently use dedicated 1.4 GHz WMTS spectrum for life-critical patient monitoring, even if the network complied with all Commission rules.

In its continuing effort to develop its licensed spectrum while safeguarding WMTS and the millions of patients who rely on that service, TerreStar by mid-2014 focused on downlink-only wireless operations as an alternative deployment approach at 1.4 GHz. The outcome of Auction 97 in early 2015, however, meant that TerreStar's licensed 1.4 GHz spectrum could not be paired with suitable mobile transmit spectrum within the near term. Given this fact, and with neither WiMAX nor standalone LTE operations at 1.4 GHz currently possible due to WMTS interference concerns, TerreStar reassessed its deployment options at 1.4 GHz during the course of 2015.

After additional internal analysis and discussions with WMTS interests, TerreStar in September 2015 determined to move forward with its current plan for wireless medical telemetry use of its licensed 1.4 GHz spectrum. After years of exploring wireless applications that could coexist with and protect WMTS, TerreStar determined that expansion of this important safety-of-life service will yield greater public interest benefits than any other currently feasible use of the 1.4 GHz band. Since the fall of 2015, TerreStar has been actively preparing for WMTS deployment by meeting and working cooperatively with WMTS vendors and related industry interests on essential engineering issues, including the conversion of existing device ecosystems on current networks and the integration of TerreStar's spectrum into next-generation network hardware. Pursuant to this effort, TerreStar submitted the Waiver Request in July 2016 and subsequently re-filed this request in August 2016 following discussions with Bureau staff regarding the proposed spectrum leasing framework for this service.

TerreStar again respectfully urges that its Waiver Request be granted expeditiously, in order to yield the extraordinary public interest benefits described at length in this proceeding. TerreStar has satisfied the Commission's criteria for a temporary substantial service waiver in the commercial 1.4 GHz band.[8] Grant of the Waiver Request, with appropriate terms and

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[8] Licensees may request additional time to provide substantial service pursuant to a waiver of the applicable construction requirement under Section 1.925(b)(3) of the Commission's rules, or pursuant to the extension of time criteria in Section 1.946(e) of the rules. *See* 47 C.F.R. §§ 1.925(b)(3), 1.946(e); *see also Wireless Telecommunications Bureau Reminds Wireless Licensees of Construction Obligations*, Public Notice, DA 17-573, at 2-4 (WTB rel. June 12, 2017) ("*Wireless Construction PN*"). The Bureau's Mobility Division has made clear that where a licensee has sought extension of its construction deadlines pursuant to both Section 1.925(b)(3) and 1.946(e) of the Commission's rules, it has discretion to grant the request pursuant to the Commission's Section 1.925 waiver criteria. *PCS PARTNERS, L.P.; Applications for Waiver and Limited Extension of Time, et al.*, Order on Reconsideration, WT Docket No. 12-202, DA 17-68, ¶ 20 (WTB rel. Jan. 18, 2017). In addition, if a licensee satisfies the criteria for a waiver of its substantial service requirement, the Bureau need not reach its request for extension under

conditions, will advance the development of wireless medical telemetry at 1.4 GHz and improve patient care at health care facilities around the United States.

Pursuant to section 1.1206(b)(2) of the Commission's rules, 47 C.F.R. § 1.1206(b)(2), this *ex parte* notification and the attached slide presentation are being filed electronically for inclusion in the public record of the above-referenced proceeding.

Respectfully submitted,

/s/ *Regina M. Keeney*
Regina M. Keeney

cc: Rachael Bender
Jay Kaplan

Section 1.946(e). *See Maritime Communications/Land Mobile, LLC, Debtor-in-Possession*, Order, FCC File Nos. 0007603776-79; FCC File No. 0005552500, DA 17-450, ¶ 15, n.50 (WTB rel. May 11, 2017) (granting two-year waiver of Part 80 substantial service requirement for Automated Maritime Telecommunications System licenses).

In any event, TerreStar also meets the requirements of Section 1.946(e), based on the facts provided above and in the Supplemental Comments. 47 C.F.R. § 1.946(e). TerreStar was effectively precluded from meeting its April 23, 2017 substantial service deadline by a unique cause that was beyond its control (*see Wireless Construction PN* at 2-3), the susceptibility of low-power WMTS equipment to detrimental interference from TerreStar's planned adjacent-band, rule-compliant commercial wireless operations. This vulnerability became clear during 2014, only after extensive technical analysis and cooperative discussions with WMTS interests. TerreStar's smart-grid WiMAX operations or standalone LTE operations in its licensed spectrum – even if fully compliant with the Commission's rules – would likely have had a significant, deleterious impact on life-critical WMTS devices and systems at health care facilities across the United States. TerreStar was determined to avoid this detrimental health care outcome and the resulting, severe public interest harm. Instead, TerreStar in late 2015 determined to implement wireless medical telemetry operations in its licensed 1.4 GHz spectrum, but it cannot do so until the Bureau grants its August 2016 Waiver Request.

TerreStar

TerreStar and Medical Telemetry

Summary

- **Original Application:** TerreStar emerged from bankruptcy with a fully developed ability to deploy WiMAX Smart Grid systems.

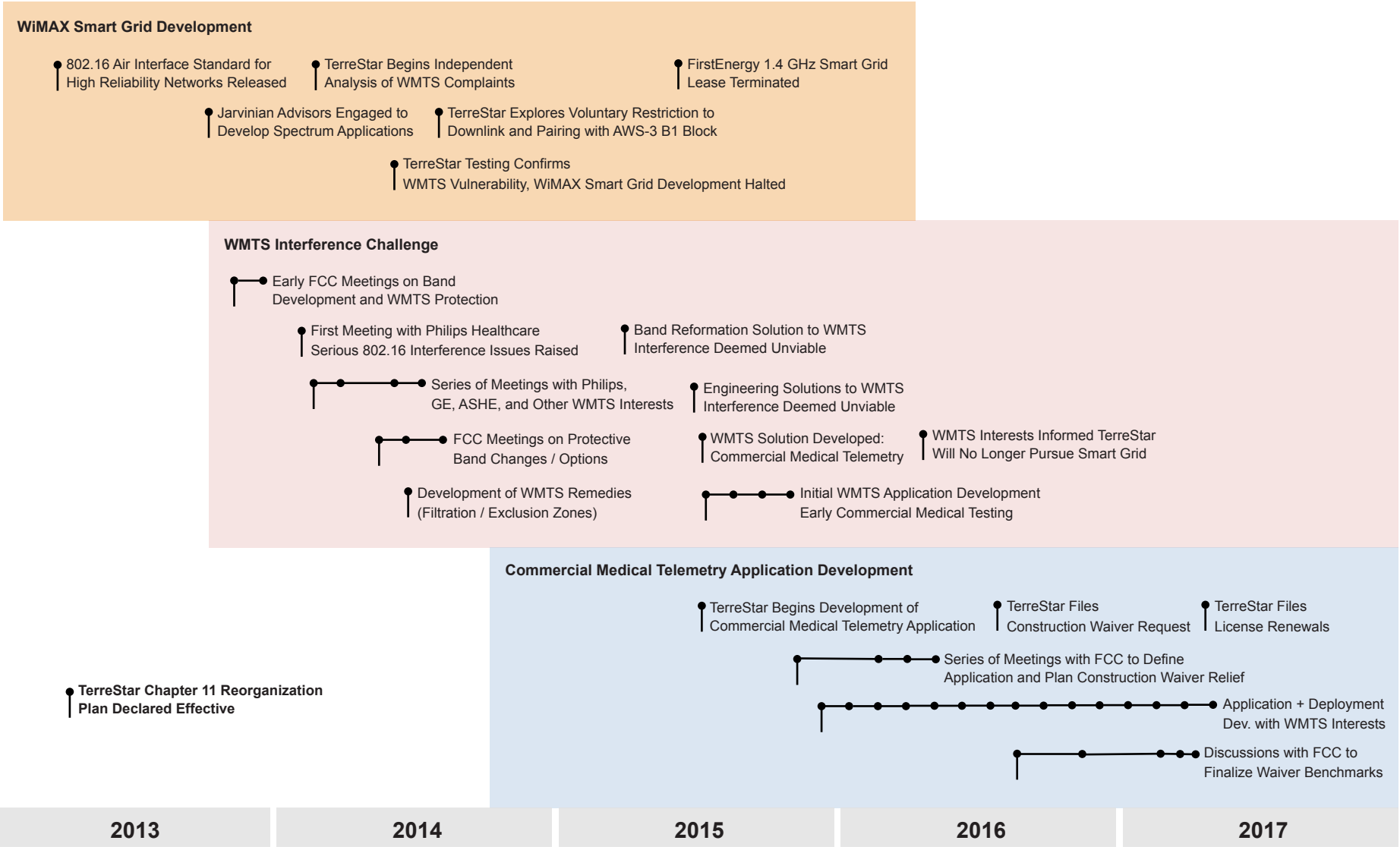
- **Medical Telemetry Interference Concerns:** Wireless Medical Telemetry Service (WMTS) interests alerted TerreStar that 802.16 WiMAX Smart Grid operations would present a significant danger to patient safety.

- **Innovative Solution in the Public Interest:** TerreStar worked diligently with WMTS interests and the FCC to arrive at a viable technical solution, and this resulted in a wireless medical telemetry application for commercial 1.4 GHz.

- **Urgent Need for Regulatory Relief:** With the requested waiver, the wireless medical telemetry application at 1.4 GHz will safeguard WMTS, while quickly adding much needed capacity and functionality to medical telemetry networks.

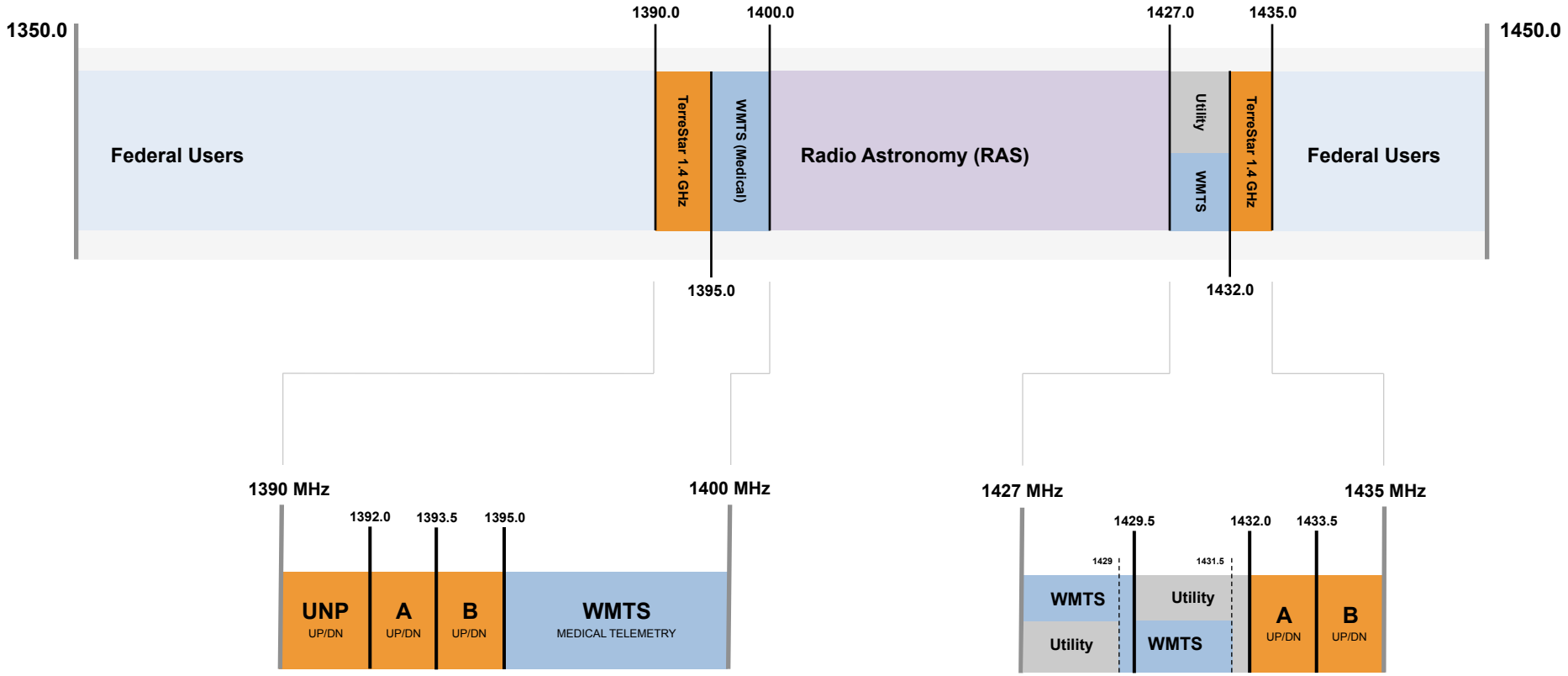
TerreStar Corporation Post-Reorganization

Emerging from bankruptcy in 2013 with a fully developed ability to deploy WiMAX Smart Grid systems, TerreStar deployment was halted by serious WMTS patient safety concerns. The commercial medical telemetry application emerged as an innovative solution.



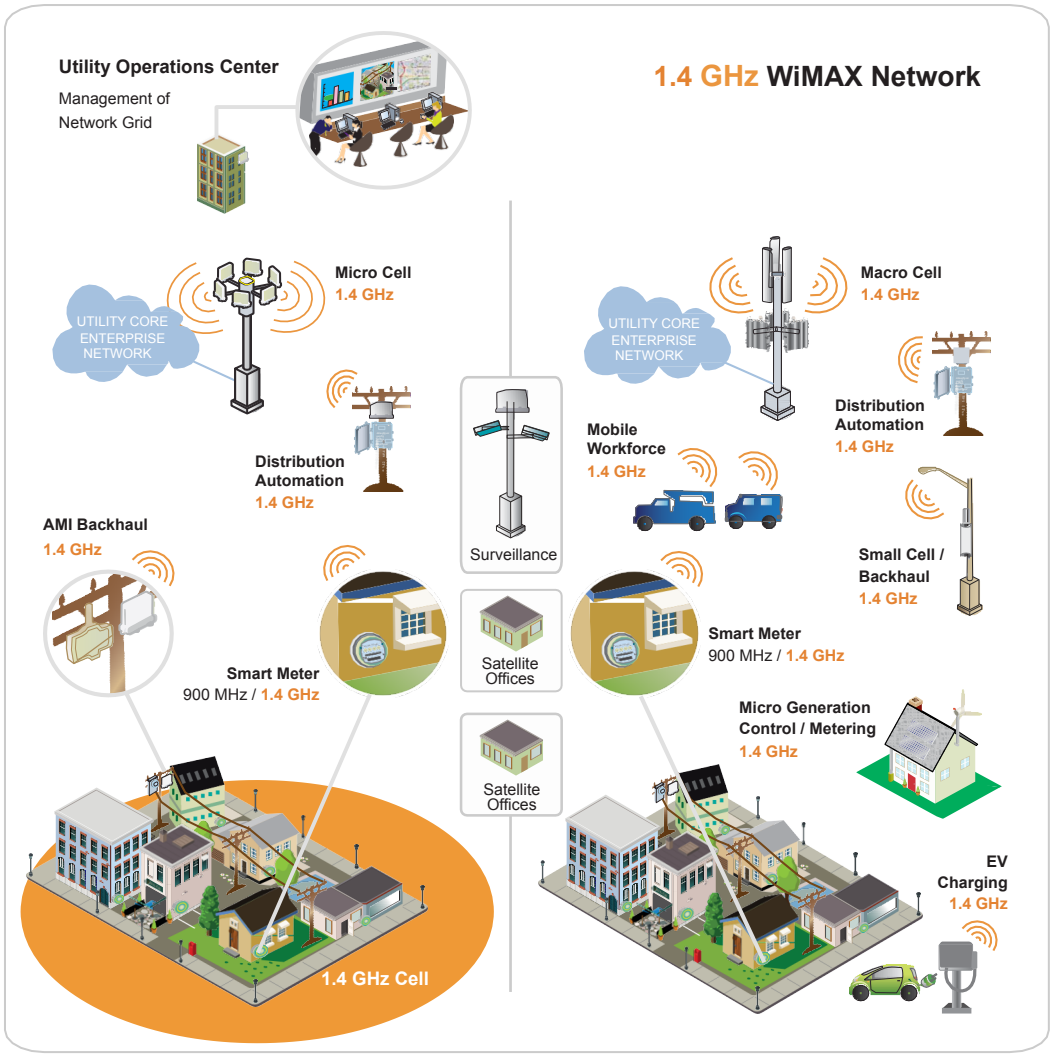
TerreStar and WMTS Allocations at 1.4 GHz

The commercial 1.4 GHz and WMTS bands sit directly adjacent to one another. While the proximity of both allocations initially represented a danger to patient safety, it ultimately enabled use of the commercial band by medical telemetry networks.



TerreStar WiMAX Smart Grid Solution at 1.4 GHz

Smart Grid has become a central element in electrical utility modernization. Supporting a full ecosystem, TerreStar 1.4 GHz is the only nationwide licensed broadband allocation suitable for dedicated Smart Grid service.



1.4 GHz WiMAX Ecosystem

Base Station
Airspan MicroMAX

Mobile CPE
Airspan MRT

Portable Dongle
Airspan MiMAX

Indoor CPE
Airspan MiMAX Easy

Indoor / Outdoor Cell
Airspan MiMAX Pro

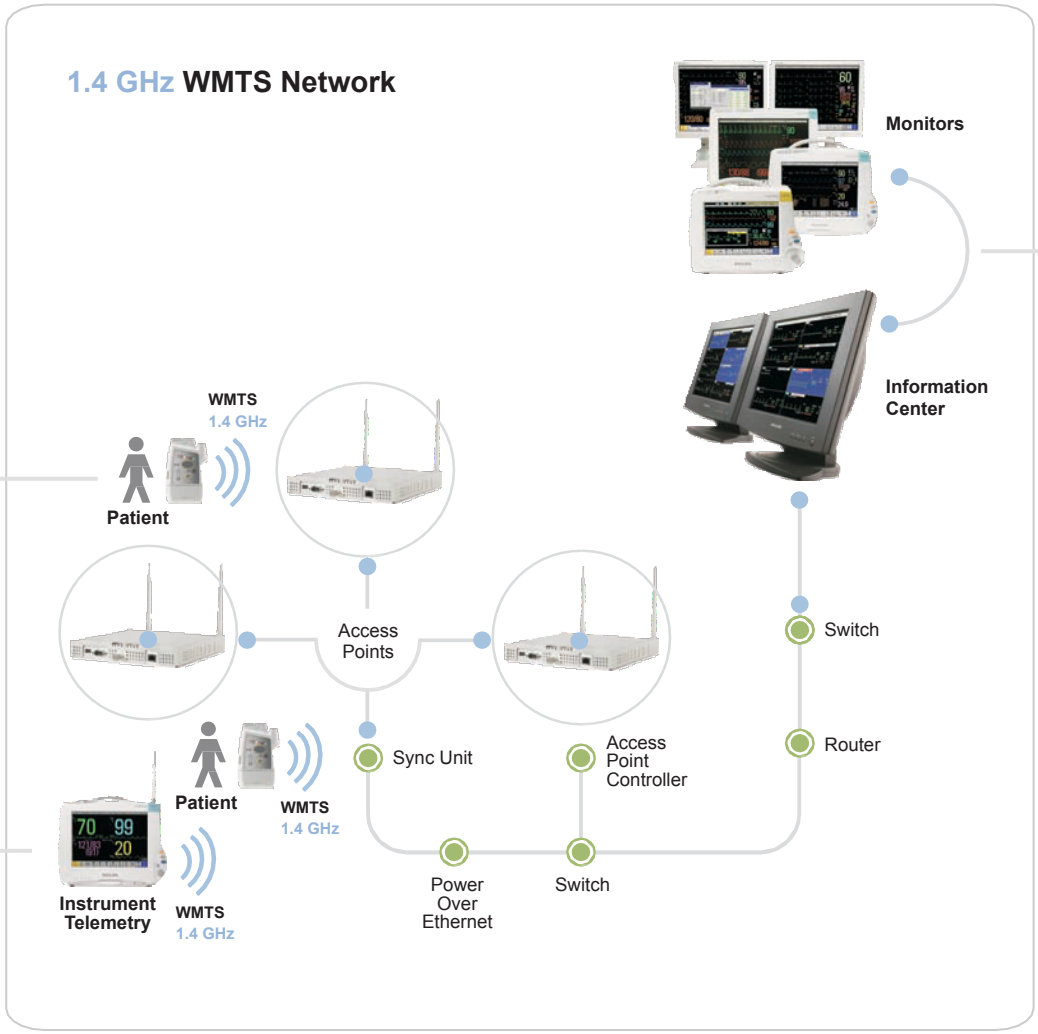
Base Station
Airspan Air4G

Base Station / Backhaul
Airspan AirSynergy

Base Stations / Nodes
Cisco Connected Grid

Wireless Medical Telemetry Service at 1.4 GHz

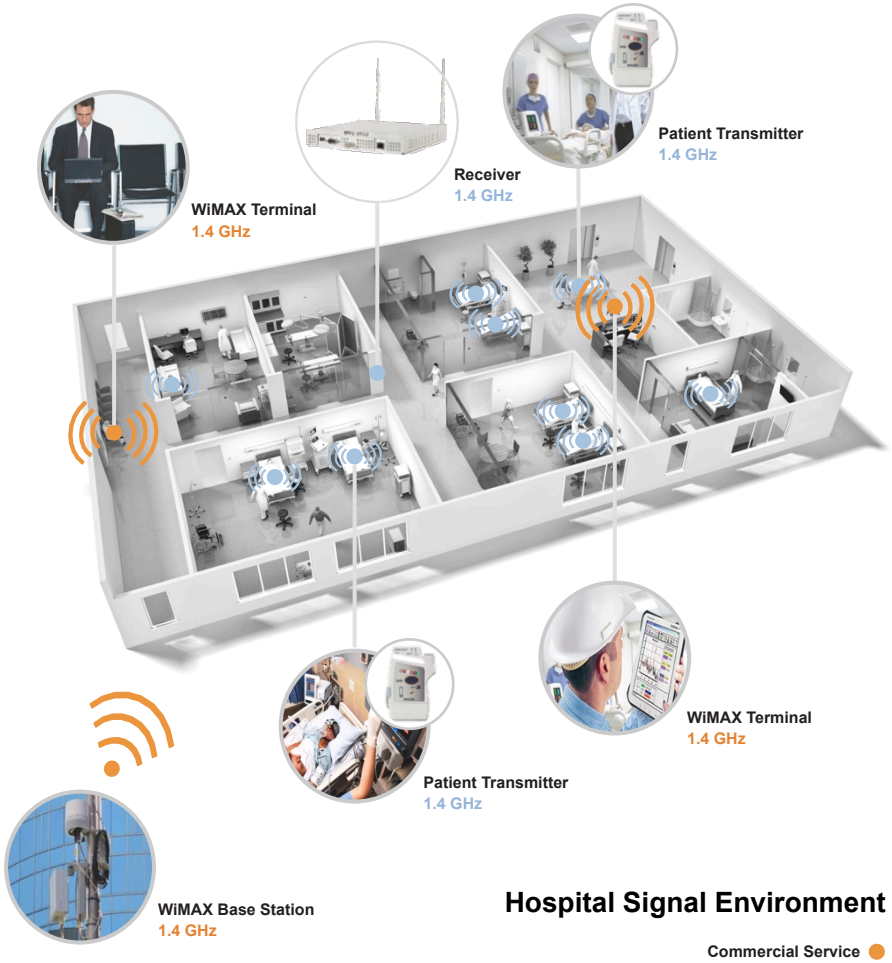
WMTS systems operating in the 1.4 GHz band provide life critical services at nearly 2,000 major healthcare facilities. Each day, WMTS at 1.4 GHz enables real time monitoring for more than 300,000 high risk patients.



Real Time
Patient Vitals Monitoring

Why WMTS at 1.4 GHz is Vulnerable to Interference

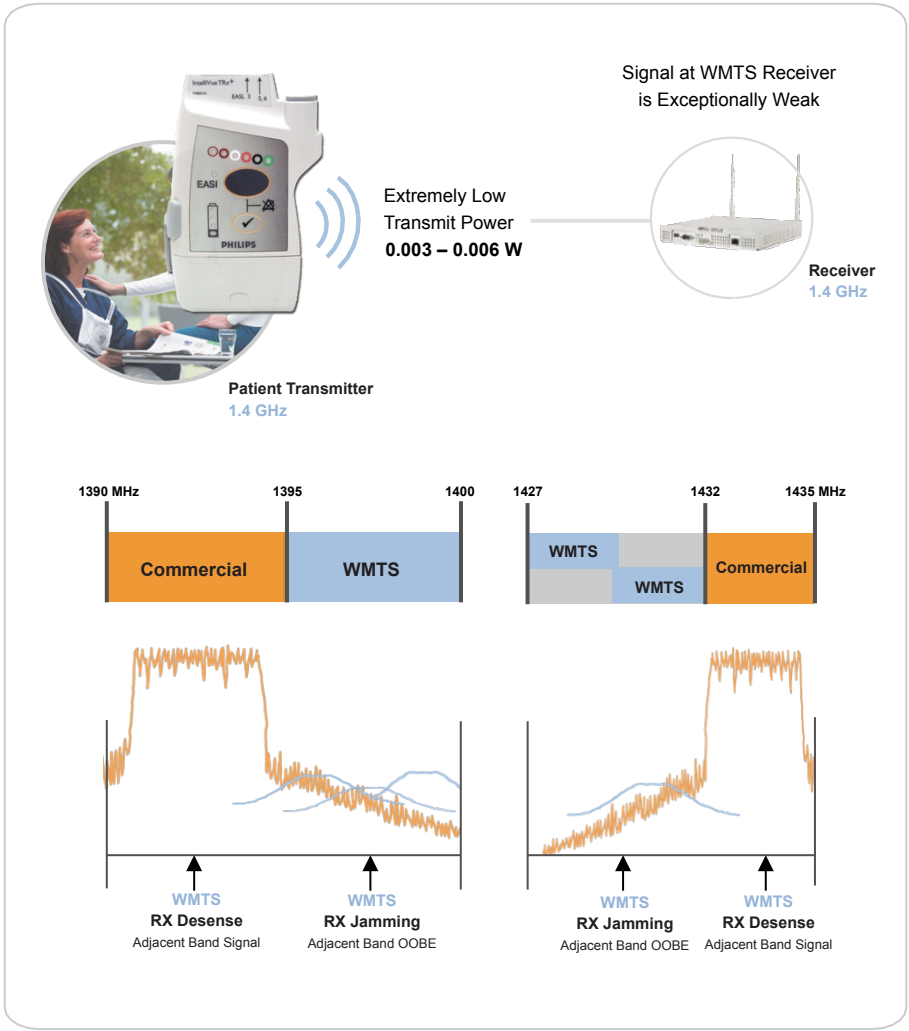
To ensure continuous 24/7 biometric telemetry with practical batteries, 1.4 GHz WMTS systems must use extremely low powers and high sensitivity receivers. This makes life critical patient monitoring networks vulnerable to current 1.4 GHz WiMAX equipment.



Hospital Signal Environment

Commercial Service

Medical Telemetry (WMTS)

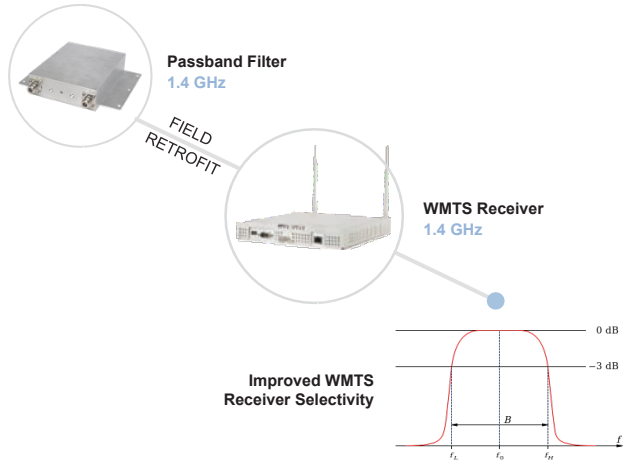


Attempts to Resolve 1.4 GHz WMTS Vulnerability

Once testing and analysis convinced TerreStar that its Part 27 compliant WiMAX emissions represented a serious danger to patient safety, the company aggressively pursued technical remedies ranging from filters to geographic exclusion zones.

Receiver Filtration Solution

Theoretical Implementation



Practical Challenges with Current Technology

Logistics / Safety: WMTS equipment was not designed to accommodate external filters. Field modification would take years and disrupt life critical patient monitoring.

Engineering: Filters would not protect against out of band emissions, especially from mobile devices. Passband attenuation would degrade sensitivity of WMTS receivers.

NOT VIABLE

Exclusion Zone Solution

Theoretical Implementation

Practical Challenges with Current Technology

Economics: Even minimal exclusion zones (1 km) around approximately 3,800 registered WMTS facilities would cripple the commercial smart grid service across most of the populated land mass.

Engineering: Exclusion zones would not guarantee elimination of mobile terminal emissions within or near the medical facility. Testing indicated this to be the greatest threat to WMTS systems.

NOT VIABLE

Creation of a Commercial Medical Telemetry Application at 1.4 GHz

Unable to protect WMTS and still retain the commercial viability of its Smart Grid service, TerreStar developed an innovative medical telemetry solution. The company will use the software definability of WMTS devices to create a commercial medical telemetry application.

Current 1.4 GHz Medical Telemetry

Adjacent Band Interference Threat

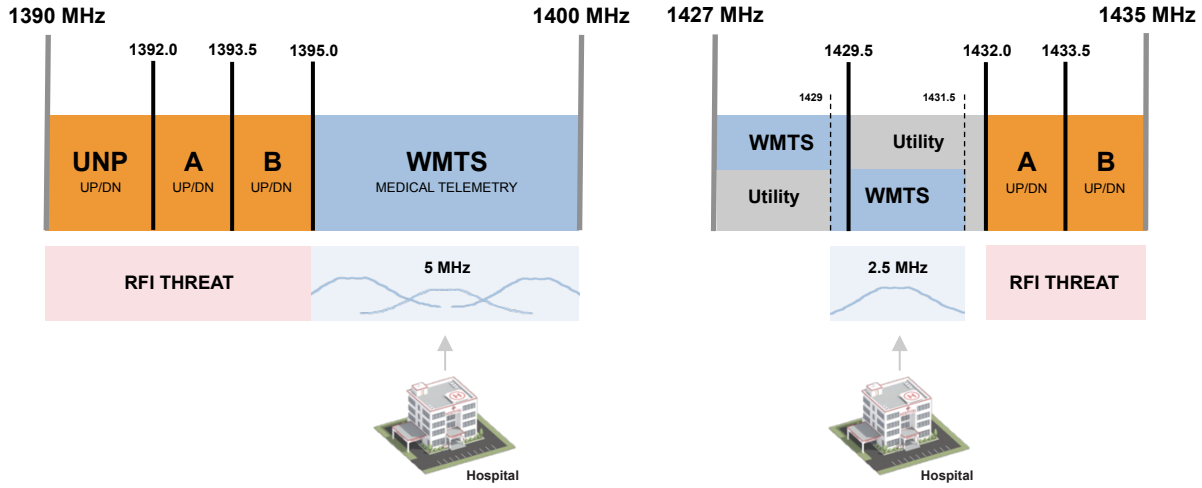
Severe

Patient Monitoring Spectrum in Hospitals

7.5 MHz

Patient Monitoring Spectrum Outside of Hospitals

0 MHz



Proposed Use of TerreStar 1.4 GHz

Adjacent Band Interference Threat

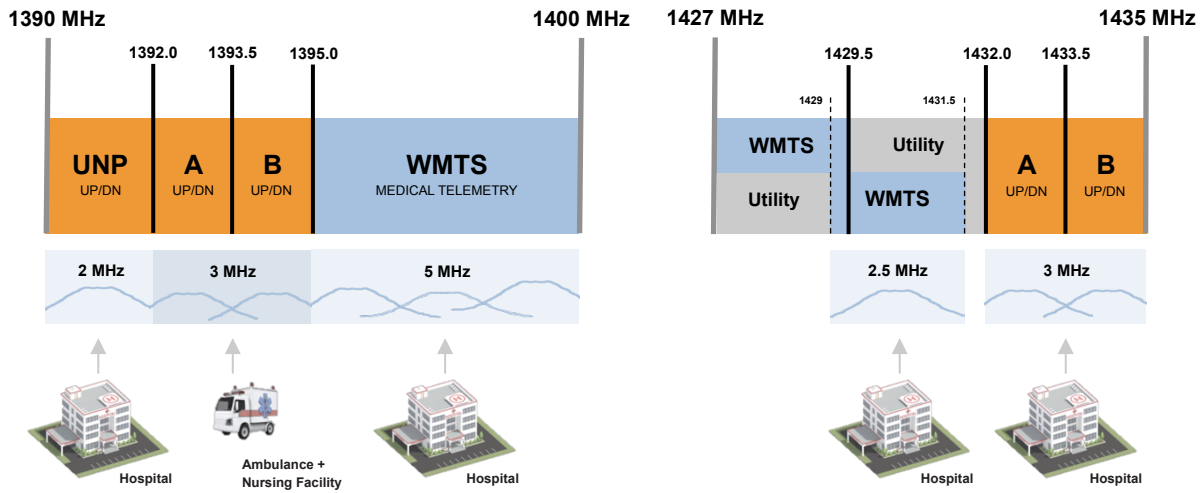
None

Patient Monitoring Spectrum in Hospitals

12.5 MHz

Patient Monitoring Spectrum Outside of Hospitals

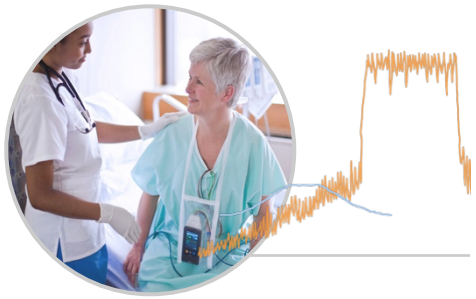
3 MHz



Impact of Commercial Medical Telemetry

TerreStar's commercial medical telemetry application will immediately expand WMTS capacity nationwide by at least 67%, while removing interference threats. Moreover, additional spectrum will be used for medical telemetry use cases not possible under WMTS rules.

Increased Patient Safety



- **Removal of 802.16 WiMAX Interference Threat in the Adjacent Band**
- **Removal of Non-Medical Mobile Operations**
- **Additional Channel Capacity for Frequency Diversity**

Expanded Interference Free Spectrum for Life Critical Applications

Increased Network Capacity

- **12.5 MHz of Spectrum for Patient Monitoring in Hospitals (67% Increase)**
- **Immediately Needed Capacity to Cover Growing Patient Monitoring Load**
- **Increased Bandwidth for New Types of Advanced Patient Telemetry**

Expanded Capacity for Growing Patient Population and Advanced Monitoring

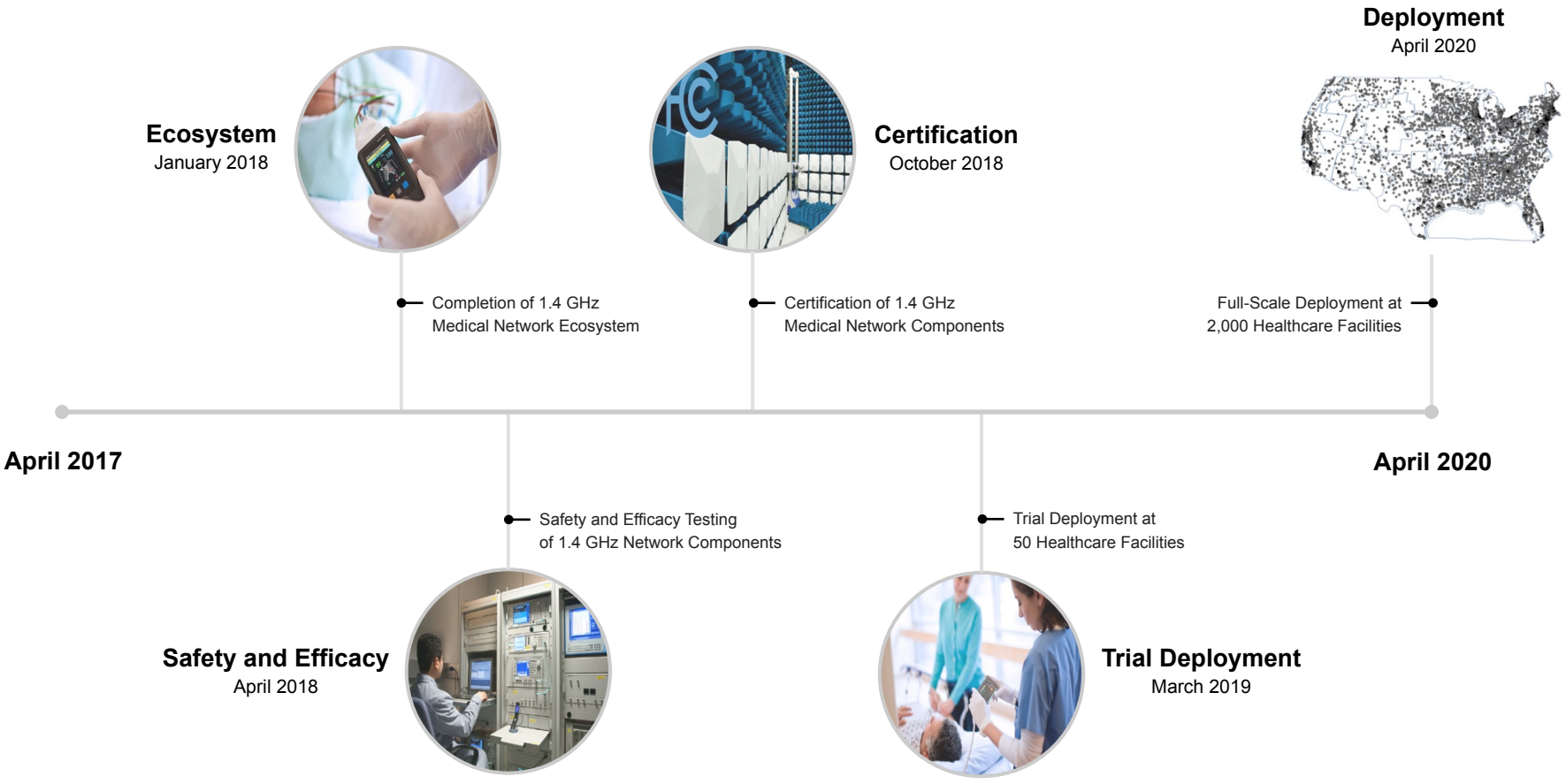
Increased Network Flexibility

- **Additional 3 MHz of Spectrum for Use Outside of Hospitals**
- **Ability to Operate in Ambulances, Nursing Facilities, and Rural Clinics**
- **Continuous Monitoring from Incident to Transport to Treatment**

Life Critical Monitoring of Patients in Places WMTS Cannot Operate

TerreStar's Implementation Plan for Medical Telemetry

Following more than two years of development, TerreStar plans to provide service to 2,000 hospitals within 36 months (more than 100% of the current 1.4 GHz footprint). Additionally, the company will enable medical services that go beyond existing Part 95 WMTS limitations.



Support from Medical Telemetry Stakeholders

Organizations responsible for the safety and long-term efficacy of WMTS support TerreStar's waiver request. They recognize that this service will eliminate interference threats while significantly expanding medical telemetry capacity.

PHILIPS Healthcare

"Commission grant of this waiver for a three-year period is in the public interest because it would allow the expansion of critically-needed patient health monitoring while avoiding the substantial potential for interference between incompatible systems in immediately adjacent spectrum."

"The interference potential of deploying WiMAX 802.16 systems adjacent to WMTS spectrum is very real and of significant concern to the WMTS community. Philips therefore welcomed the creative approach that TerreStar described in its Waiver Request."

"We are genuinely excited by TerreStar's proposal as submitted to the Commission. TerreStar's proposal is consistent with our discussions and has our full support because it provides a practical pathway to substantially improving patient care in the United States through wireless monitoring."

(WT Docket No. 16-290)

Philips Healthcare is the largest provider of 1.4 GHz Wireless Medical Telemetry Service networks, representing the overwhelming majority of registered deployments.

GE Healthcare

"The FCC has long recognized "the importance of the Wireless Medical Telemetry Service ("WMTS") to patient care" and the critical need to protect its "safety-of-life" operations from harmful interference."

"We agree with TerreStar that its plans to support wireless medical telemetry would not be feasible without a temporary waiver of its substantial service requirements. It could take up to three years for TerreStar, equipment manufacturers, and healthcare providers to develop, test, and deploy wireless medical telemetry systems that can viably operate on TerreStar's 1.4 GHz spectrum."

"…the number of locations that use WMTS is expected to increase significantly as hospitals seek to better address the problems raised by an aging U.S. patient population and increased patient acuities. Thus, there is a growing demand for WMTS spectrum to support remote patient monitoring. …The Commission can help address this growing need for additional WMTS spectrum by granting TerreStar's request."

(WT Docket No. 16-290)

"The Commission can help address the growing need for additional wireless medical telemetry spectrum by, among other things, granting TerreStar's request to use its licensed spectrum to support wireless medical telemetry operations in the 1390-1392, 1392-1395, and 1432-1435 MHz bands. This additional spectrum would increase the capacity for such 1.4 GHz operations by approximately 67 percent. The spectrum is also well situated, as it is adjacent to two bands that are already used for WMTS."

(GN Docket No. 16-46)

ASHE

"ASHE welcomes TerreStar's recognition of the vital importance of WMTS systems in significantly enhancing the standard of patient care. ASHE also appreciates TerreStar's recognition of the likely spectrum shortage facing WMTS licensees, and of the substantial benefit that can be realized by making the 1390-1395 MHz and 1432-1435 MHz bands available for use in WMTS systems."

(WT Docket No. 16-290)

"WMTS operations in the 1.4 GHz band also have proven to be a great success. The total number of deployments in the 1.4 GHz band has increased about 20% per year since 2013 with a total of over 8,000 deployments as of May 2017. …Even though one manufacturer reports that its 1.4 GHz systems can support as many as 1,024 wireless monitoring devices, ASHE has heard anecdotally that some areas with a concentration of health care facilities are experiencing WMTS saturation due to a lack of 1.4 GHz spectrum."

"In that regard, ASHE welcomed the request of TerreStar Corporation for a temporary waiver of the FCC's substantial service deadline for TerreStar's commercial wireless licenses in the 1.4 GHz band adjacent to WMTS in order to expand medical telemetry capacity. Specifically, TerreStar's planned implementation of WMTS in the commercial 1.4 GHz band would extend medical telemetry services within health care facilities to the unpaired 1.4 GHz band (1390-1392 MHz) and upper 1.4 GHz A+B Blocks (1432-1435 MHz), and establish new medical telemetry services in the lower 1.4 GHz A+B Blocks (1392-1395 MHz)."

(GN Docket No. 16-46)